EVOLUTION, TELEOLOGY, AND HISTORY

THIS essay is an inquiry into the correlation of some fundamental views of the world and ourselves in it. Our main concern will be to understand more clearly the meaning and the scope of evolution. But to this end we shall first try to distinguish the historical pattern of ideas from that of the physical sciences. Traditional terms like natural history and natural science indicate an awareness of some kinships but also of a basic difference in outlook which should be clarified. We ask: Does the world-view of physical science include any recognition of history in nature? The readily forthcoming negative answer would indicate the need of recognizing the historical and maybe yet other types of interpretation as essential to a comprehensive understanding of nature and human nature. And in such a more thorough world-view, we may then consider the range and the main direction of the evolutionary outlook.

A dominant tendency in modern thought has been the emphasis on a dynamic conception of nature as a system of processes. This idea has some old roots in classical antiquity, as is indicated by the varied connotation of the Greek word for nature, *physis,* from which we get our terms "physics," "physical." *Physis* meant origin or birth and growth, the source and process of activity in a thing, how it comes to be what it is, how it arises and realizes its character and constitution. The basic Greek question seems to have been: "How come?" When this active principle was regarded as the essential element, *physis* signified the primary stuff or matter, the substance or matrix of which things are made. *Physis* also came to connote the power of growth or vital agency in living things. Or else the essence of things was

viewed in terms of their form and system, and then *physis* was considered as the cosmic order, and by extension the universe.

The Latin word *natura* had a similar flexibility of meaning. It was derived from the verb *nascor,* meaning "to be born." "The nature of things" signified their birth and original production, their heart and core, their essential substance and constitution. It came to mean the orderly source and course, the generation and pattern of things. In this brief verbal analysis the student of ancient thought may recognize hints of leading ideas in contending philosophical theories.

The emphasis on process is evident in the fundamental contemporary reconstruction of physics. In philosophy it may be noted in the ascendency of activism. Its kinship with an expansive evolutionary interpretation of all nature seems obvious: so obvious indeed as to call for some cautious reappraisal. Still more critically we should consider here the conclusion of some activists that the view of the world as process implies a basically historical perspective, a world-history. The growing importance of genetic methods of research, scientific explanation in terms of development, both of them have seemed to indicate a historical slant of thought. The South African philosopher, General Smuts, stated: "If activity is the essence of the universe, we see more easily why the universe is evolutionary and historical rather than static and unchangeable."[1] And John Dewey was even more explicit: "Aside from mathematics, all knowledge is historic; chemistry, geology, physiology, as well as anthropology and those human events to which, arrogantly, we usually restrict the title of history."[2] Hegel, on the other hand, rejected the appropriateness of the term "natural history." He declared roundly: "Nature has no history."[3] We have here two half-

truths or two partial truths; the balance of emphasis, in our judgment, should incline towards Hegel's view. History, strictly considered, would seem to be concerned with distinctively human affairs. But this historical character, which is preëminently manifested in the careers of men and peoples, may also be regarded as a cosmic aspect which we can recognize in a measure, though far less relevantly or less significantly, in other fields of nature.

Keeping in mind the sharp divergence of judgment indicated above and our initial surmise by way of reconciliation, we should turn more carefully to our problem. Decisively characteristic of physical science is its view of the causal uniformity of nature. From this standpoint every type of process is to be regarded and explained as the necessary result of some variety of antecedent conditions. This system of uniformities is viewed as the general cosmic pattern. The detailed processes, to be sure, are in time, but the necessary connection which they exemplify are basic characteristics of the entire system across the time-span of specific occurrences. The book of nature, as read by physical science, has no distinctively historical pages, or we may say that its uniformities are all on one vast cosmic page. There is, to be sure, a history of physical science as a human activity and achievement; but is it conceivable that we could study the subject matter of physics or chemistry in any kind of historical order?

Thus we may say that physical nature, throughout numberless changes, manifests its basic and invariable uniformities. It does not reveal the progressive development and self-realization, or else the frustration, decline and fall, which are the marks of a historical perspective. In our day this view has been developed by Collingwood and also by the Spanish philosopher Ortega y Gasset. The so-called science

of human nature, according to them, is a misconceived undertaking. It set out from the false presupposition that there is a certain entity called mind which is and remains there awaiting our analysis. But actually men and men's minds do not stay put, to be described and defined abstractly. Persons are ever in the process of achieving, developing, or misdirecting their character and significance. Their career must be studied in a biographical or historical view. Most emphatically Ortega y Gasset insists: "Man . . . has no nature; what he has is . . . history."[4] So the proper study of man is history, and we may say explicitly that the various humanities are chapters or branches of history.

This sharp separation of physical nature and human history calls for a cautious reconsideration, especially when we deal with the biological sciences. Is it altogether without significance that evolutionary ideas have been used so extensively in the various humanities: from the evolution of species to the evolution of social and economic institutions, evolution of language, of morals, of religion? Our attention may thus be directed to the essentially genetic and developmental character of evolutionary research, be it biological, anthropological, or explicitly humanistic. This aspect of evolutionism has been related to the basic outlook on reality as process. But is this outlook historical?

We should be on our guard here to avoid a confusion of fundamental ideas. Evolution may be interpreted in the specific Darwinian sense as the causally determined process of the survival of the fittest in the struggle for existence through fortuitous variations adaptable to specific environments. Or evolution may be used in the broader meaning of development, the unfolding of a process or a form of activity differing in kind under a variety of conditions. To be

sure, there is a thought common to both of these uses of our term. The historian Bury called it "the *genetic* idea."[5] Darwin's epoch-making success in reconstructing biology on this genetic evolutionary basis inspired other workers to apply analogous methods to anthropological and humanistic research. This analogy of method has often been ambiguous. It has been guided by a due recognition of the essential differences between physical processes and historical activities. But it has also tended mistakenly to proceed from the acknowledgment of some quasi-historical aspects of the sequence of events in biological evolution, to the inference that human history can also be understood in strictly physical-biological terms.

The distinction here should not be drawn too sharply or rigidly, but neither should it be dismissed. The sound distinction should be one of emphasis. Historical studies may retain some elements of "naturalistic" method which is characteristic and dominant in physical science. Science in the form of "natural history" may entertain some aspects of the method which is more clearly and appropriately used in human history. We can understand both the correlation and the distinction between these two as our cosmic outlook proceeds from one of these perspectives to the other.

In making this last distinction we are, of course, clearly aware that we are comparing and also contrasting a necessarily abstract view of reality with one that aims at greater concreteness. From this standpoint it may be said that the abstract universality of the physical sciences cannot grasp fully the concrete reality which is portrayed in the historical perspective. The so-called natural history or history of nature is, as Croce put it, a "pseudo-history."[6] If I am to view anything in nature in a truly historical manner, I should have

to cease regarding it as of a certain class or genus and should try to see it concretely in the way in which I would have to consider it if it were human. I might then proceed to study the biography, say, of a grizzly or of a glacier or a dust bowl, but as it came to manifest historical portraiture it would tend to lose scientific analysis and definition. The strict scientist might even suspect such accounts as "nature-faking." On the other hand, we should not overlook the opposite procedure, in which the concrete actuality of ongoing human life has been forced, with what may be called "history-faking," into the abstract framework of materialistic determinism.

This distinction, between scientific explanation and historical portraiture, points to a basic issue of philosophical interpretation. It is the issue between mechanism and teleology. It is accentuated in biology even more than in the other physical sciences; or better, the fundamental account of biological processes emphasizes the issue in a distinctive way which is decisive.

Physics and chemistry in their own fields and perspectives proceed on a definitely mechanistic basis. It would be only confusing to import teleological reasoning into astronomy or geology. Modern physical science has made its great advances precisely because it has recognized and respected its own appropriate postulates. Our problem here arises when we turn from strict physics to a more integral view of nature and human nature. The commitment to mechanistic categories, which is essential to the effective physical account of nature, misses somehow the characteristic interpretation of human lives. Valid in its own field and on its own postulates, physical science seems to indicate the need of other significant views of nature, if we are to understand ourselves and our own scientific activities as well as the physical sys-

tem of the world with which we are dealing. So we may say that while the principle of teleology is not required, is indeed excluded, in physical science itself, it is raised as a problem by physical science in its relation to an ultimate philosophical interpretation of reality.

The role of teleological reasoning in biology seems to be a different one, but about this alleged difference there has been a radical controversy in evolutionary theory. We should appraise this disputed evolutionary teleology by considering some of the contending views about it.

One side of the argument is the strictly mechanistic interpretation of evolution. The materialistic evolutionist judges that Darwin's principal systematic achievement was his integration of biology with the other physical sciences, his exclusion of Providential or any other kind of design as a biological explanatory principle. According to this view, the fuller development of evolutionary biology must be only along these mechanistic lines. Thus Ernst Haeckel advocated explicitly a "dysteleological" method. Against any appeal to design in biological theory or against any interpretation of adaptation or fitness as in any sense purposive, he demanded insistently a mechanistic explanation analogous to that in physics and chemistry.

The mechanistic evolutionist has dismissed the traditional doctrine of design both by outright rejection and by citation of negative evidence. One type of evidence for "dysteleology" or purposelessness is that of rudimentary or vestigial organs. How can a teleological biology explain the vermiform appendix in the human intestinal system? In our herbivorous ancestors it was much larger and of great digestive use. In us it is an evolutionary survival, useless and often injurious. The comparative anatomist can undestand its

persistence, if he adheres to his mechanistic view of zoological evolution. On a teleological plan, however, it is only perplexing. In a theological version of a design in nature, it would cast reflection either on the goodness or on the good sense of Divine Providence.

This sort of strictly mechanistic rejection of purposive adaptation in any form has been criticized as failing to do justice to many facts in biological evolution. Some of these objections seem fundamental. Without reverting to the traditional doctrine of Providential design in nature, some biologists have found it necessary to include in their evolutionary theories the recognition of teleology in some form. A consideration of some of the more important alternatives to a rigidly mechanistic biology may outline the wide range of basic thinking in the evolutionary field. I shall be brief because the major theories have been examined with great care by my colleague in this symposium, Professor Fulton.

In the history of ideas, Vitalism in some form has always expressed the insistence that living beings manifest something unique and fundamentally different from anything in the fields of physics and chemistry. To understand living behavior we must recognize some special directive power in every organism. This trend of speculation connects the names of Erigena, Paracelsus, Stahl, Schopenhauer. The unique teleological factor has been called by various names: vital principle, vital force, or as Hans Driesch, a chief modern advocate of the theory, phrases it, borrowing his term from Aristotle, "entelechy." The modern vitalist rejects any mechanistic reductionism in biology. Unlike physical or chemical process, organic behavior and evolution manifest a certain autonomy of character, a unique principle of adaptation for self-maintenance. The observable facts of organic regen-

eration indicate an integral capacity of the organism to act determinately as a whole on any of its specific parts. This mutuality of the whole and its parts is inexplicable on any rigidly mechanistic theory.

This doctrine has, of course, met strong rebuffs from the mechanists, but it has also been severely criticized by thinkers who question or who reject strict materialism. Instead of postulating a special "vital force" to explain biological processes, should we not rather study the behavior of living beings, recognizing both the features which are shared with physical and chemical reactions, and also the peculiar and distinctive biological characteristics? Among the latter, special attention has been called to self-repair and restoration, to the related biological principle of maintenance of normality, and to the factors of integration and coördinated behavior. Vitalism has been criticized for its proposed cleavage between organic and inorganic nature. Why maintain such a radical discontinuity? Why may it not be that the physico-chemical substances and processes, under certain so-called organic conditions, become the matrix for the manifestation of new properties and new forms of behavior?

This latter alternative view is expressed in the theory of Emergent Evolution, advocated by the biologist Lloyd Morgan and expanded with systematic mastery in the cosmology of Samuel Alexander. Alexander's statement may be cited: "New orders of finites come into existence in Time. . . . New complexity of motions come into existence, a new quality emerges. . . ."[7] The primary groundwork of existence, which Alexander calls Space-Time, operates in a system of causal mechanism familiar to us in the physical sciences. But under certain conditions it becomes the matrix for a radically new order and quality of being which we call Life. And just as

Life thus unpredictably yet unmistakably emerges out of Space-Time, so Mind emerges out of Life, intelligence out of organic-biological behavior.

In considering the relation of the lower or matrix to the higher or emergent character, we are warned to avoid a twofold error. We should not, like the materialists, reduce the higher to the lower and interpret life and mind as simply more complex mechanisms. Nor should we, like so many idealists, overemphasize the higher quality and regard physical existence as essentially a latent form of spirit. At every level of existence we should do justice to the facts: recognize that level for what it is, but also see it as the emergent from lower levels and likewise as the matrix of a higher realization. The theory of emergent evolution would avoid oversimplification of nature or reductionism in any direction. It would recognize the complexity of existence with its three main stages, physical mechanism, life, and mind. And it would not rigidly assign limits to the process of emergence, for Mind already indicates a boundless upward reach of spiritual character. All along this dynamic range the higher quality is nowise a mere resultant or a predictable effect. It is in each case an instance of genuine upsurge in nature. And this fundamental character of emergence, outstandingly evident in the uprise of Life and of Mind, is manifested all along the line. Thus the emergence of consciousness covers a widespread gradation of processes, from the most rudimentary behavior of low organisms to the most complex intelligence in man.

In his theory of emergence Alexander viewed the entire cosmic span, from Space-Time to Deity. He regarded evolution as the natural history of values. "Darwinism is sometimes thought to be indifferent to values. It is in fact the history

of how values come into existence in the world of life. . . . The doctrine of natural selection explains not how types are generated but how they come to have value."[8] The arrow of dynamic reality at the level of spiritual activity points to an ever higher summit. We cannot assign any limits to creative intelligence. This ever higher emergent quality is what Alexander means by "Deity." We cannot define it, and we cannot say that it exists, but by its very character it is ever potential, the infinite Divine Beyond.

An equally radical alternative to mechanistic biology is Henri Bergson's theory of Creative Evolution. The adjective in this term is intended to characterize not only evolution but reality altogether. Bergson criticizes the sciences and the philosophies of the past for their failure to give due recognition to the integral ongoing current of existence. In theory of knowledge he seeks to expose the inadequacy of intellectual construction with its schematic procedure. He objects to the misinterpretation of real time, duration, as a succession of discrete extents or moments. He criticizes the misleading view of the course of existence as a series of events. Against both the mechanistic outlook on nature as predetermined in every detail and the eternally planned teleology of Providential design, he champions the recognition of really creative consciousness and the living stream of reality.

Bergson maintains activism in cosmology without any reservation. "There are no things, there are only actions."[9] The cosmic agency, all-pervading in every living process, is the creative flood itself, the vital urge manifested through-our nature. He called it the *élan vital.* But it should be stated clearly that Bergson's insistence on the unpredictable creativity of living processes does not exclude absolutely the use of causal explanation in biology: not absolutely. Our

abstract mechanism, which serves us well enough perhaps, though imperfectly, in physics and chemistry, has its part in biology also. But in biology its part is nowise the chief role. The chief role, the dynamic principle in evolution, is the *élan vital.* Immersed in matter, it spurts out in ever new currents. We can regard plant and animal life as the two main directions of its outpouring, two ways of accumulating energy and then letting it flow into flexible channels. All the way through, we should emphasize the vital urge; we should get into the evolutionary flux itself, not reduce it to stages which we then artificially try to recompose.

The more directly we observe ourselves, the more clearly we see that we never stay put as mere discrete entities, but on the contrary are continually in a process of achieving ourselves. In the perspective of creative evolution we have no abstract universal character that can be analyzed and formulated. We require a historical account: not explanation but portraiture. What is so evidently true of ourselves is true, in different degrees, also of lower forms of life in the stream of evolution. Evolving life manifests the origins and growth of new lives. The study of it is concerned primarily with genesis rather than with the repeated uniformities with which so much of abstract physical science deals. So Bergson finds evolutionary inquiries enlightened by the subordination of the traditionally scientific to a creative-historical perspective.[10]

Even those who would not go the whole length with Bergson or with Lloyd Morgan and Alexander or with Driesch have felt bound to admit the inadequacy of a rigidly mechanistic biology. Surely the evolutionist cannot use the principle of adaptation without acknowledging its ultimate teleological implications. So T. H. Morgan concluded that

"the adaptations of organisms are something peculiar to living things, and their obvious purpose is to maintain the integrity of the individual or that of the species to which the individual belongs."[11] Against the mechanist's claim to Darwinian leadership, it has been maintained by J. B. S. Haldane that "the theory of natural selection does not constitute the smallest step in the direction of a mechanistic conception of life." Variation and hereditary transmission cannot be understood rightly if we regard them as mere physico-chemical effects of the environment on the plant or animal. The living organism manifests some sort of purposive agency and initiative. "Heritable variation must be regarded as a fresh striking out of life."[12]

The critics of a rigidly mechanistic theory in biology have cited a mass of evidence indicating purposive or quasi-purposive behavior, not only among mammals and birds but also at lower levels, especially among insects. The elaborate organization of insect life, in ant hills or beehives, has seemed to point beyond a strictly mechanistic explanation. Not only the functional explanations of behavior but also the structural variation of organs adapted to definite conditions in the environment appears perplexing to a strictly physico-chemical theory of evolution. Critics have pointed out that the organism seems to proceed on some sort of a self-preserving, self-promoting plan, with an initiative in variation and integration. Especially in the attainment of certain complex structures, as for instance in the evolution of the eye, there are cases where a great number of different and very delicate adjustments have to be realized before the organ can function advantageously at all. The explanation of the survival and propagation of the many initial details of such a

structure on a factual mechanistic basis seems to strain belief.

On the higher levels of animal life the evidence of dimly manifested and then more and more definite approaches to some form of mental activity raises further difficulties for the mechanist. Darwin realized that the evolutionary explanation of mental powers and the moral sense was a requisite part of his theory, and he treated these problems, with his characteristic candor and caution, in *The Descent of Man.* His work in this field stimulated his followers to important extensive studies of the evolution of mind. Distinguished works in this field are Edward Westermarck's *Origin and Development of the Moral Ideas,* L. T. Hobhouse's *Morals in Evolution,* and Alexander Sutherland's *Origin and Growth of the Moral Instinct.* Westermarck and Hobhouse center their attention on the historical evolution of morals in human life from the earliest primitive societies. Sutherland endeavors to follow Darwin further in tracing the first beginnings or antecedents of moral activity in the instincts and reactions of animal behavior. The specific theoretical explanations advanced by these and other investigators may vary in details or in some major principles, but they all share the evolutionary outlook.

We are told that in the far-flowing stream of life, organisms develop increasingly complex cerebro-neural systems capable of conscious reactions, and then of mental response, moral behavior, understanding, and judgment of values. Animal gregariousness and the herd instinct develop into human social-mindedness; the urge for fighting back and for retaliation grows into a sense of retribution, with the recognition of justice and punitive law in prospect; the parental instinct and group solidarity mature into conscious

sympathy and benevolence; the effective restraint of offending members and the corresponding individual sense of group compulsion ripen into a consciousness of moral obligation, duty, and conscience. The regard for the preservation of the herd and flock grows and may gain precedence over the concern for individual survival. In these and other ways, the preface and the first chapters of evolutionary morals have been traced by Darwin and his successors.

In a broader survey, not limited to moral behavior and not always viewed in evolutionistic perspectives, the beginnings of mental reactions in the life of the higher animals have likewise been made the subject of many detailed investigations. It may suffice here to mention one outstanding example of this type of inquiry, Wolfgang Köhler's work, *The Mentality of Apes.* Köhler noted that the brain structure and the bodily chemistry of the higher apes show greater similarity to those of human organisms than to those of the lower apes. He studied with especial care the behavior of some chimpanzees which seemed in many ways like human responses, and he raised the question whether the apes may not show intelligence analogous to ours. If this question is answered affirmatively, we may be in a position to recognize in the first or primitive instances of animal intelligence some of the characteristic factors in the evolution of mind.

Köhler does not proceed to dogmatic conclusions, but his researches indicate several lines of evidence for what may fairly be called a definite trend towards mentality in the behavior of the higher apes. The chimpanzees which he observed were capable of using roundabout methods of catching their objects. They showed some grasp of what the total situation required. They used strings or sticks or other imple-

ments to pull or push the food in the desired box or bag hanging or swinging out of their unaided reach. They would scratch a stone from the ground and throw it after an animal which they might be chasing; or, unable to move a heavy box on which they had to climb in order to grab the food suspended above their heads, they would first take out the stones that had been packed in it. They would join two sticks to lengthen their pole to the needed length, or pile up one box on top of another—four of them on one occasion —to gain the required height. This work was done sometimes in collaboration. They showed capacity for planning with foresight and with some control of very strong appetite. On their being driven from their stockade to their sleeping pens in the evening, they had to cross a spot covered with lush green weeds of which they were very fond. At first they all stormed upon their juicy fodder, but when the keeper drove them insistently towards their pens, one of the chimpanzees would suddenly stop eating and begin hastily to tear up the weeds and so would carry a tremendous bundle of them to his den.[13]

While some of these researches have been pursued without any explicitly evolutionistic purpose, they all have bearing on evolutionary theory. One interpretation of them has been to regard so-called mental behavior as the factual effect of biological reactions. But even on a basically mechanistic view of biological processes, this account must still recognize clearly the eventual attainment of mind. How is this recognition to be understood? Either we should adhere rigidly to the exclusively mechanistic perspective, in which case we miss the fundamental characteristics of mind. Or we may acknowledge the distinctive character of mental activity, of thought and understanding and purposive con-

duct and moral judgment. In that case we should discern in the evolutionary course the attainment of non-mechanical activities, teleological and rational. We should then require a reinterpretation of the evolutionary process, to account for this attainment; we should have to expand or supplement the evolutionary perspective by other views of nature and of human character.

The former, mechanistic explanation of the origin and development of mind, as gradually evolved from organic reactions and manifesting only physical and physiological properties, would claim the merit of undeviating naturalism in its explicit rejection of teleology in any form, admitting only purposeless behavior, determined mechanically. But then consistently it could not recognize genuinely purposive activity or pursuit of values anywhere, even at our human level. This view suffers from the essential defect of rigid materialism, for it cannot account for itself as a theory or for its claims to truth and validity. Reason cannot thus reason itself out of existence.

If we appraise the second view, which begins by an unambiguous recognition of mind and its various forms of intelligent activity, the further inferences from it are very significant. The first one—a revision of evolutionary doctrine to include the clear explanation of mind—is illustrated in the theories of creative evolution and emergent evolution. Secondly, these two theories in their respective ways may proceed to a more expansive cosmic outlook on nature and on human character, from a number of significant approaches. Reality is complex, and nature is not to be exhausted in any one abstract formula. The physical sciences express in their postulates a view of the cosmic mechanism, and their formulations of the structure and laws of nature have fully justified

their mechanistic perspective. Evolutionary biology has shown its merits in appropriating to its use, as much as suitable, the physico-chemical outlook on nature. This principle in biological method was defended with balanced judgment even before Darwin's work by the great physiologist Johannes Müller: "Though there appears to be something in the phenomena of living beings which cannot be explained in ordinary mechanical, physical, or chemical laws, much may be so explained, and we may without fear push these explanations as far as we can, so long as we keep to the solid ground of observation and experiment."[14] The last clause here is important in guiding sound fundamental theory in biology. Its distinctive problem, the understanding of living processes in their evolution, especially at its higher stages, has confronted the systematic evolutionist with the need of understanding the origin or the emergence of mind and of accounting for the boundless development of intelligence and of the values with which human beings have been characteristically identified. Evolutionary biology, rightly allied as it is on the one hand with the physical sciences and indeed having its basis in them, seems to open new vistas on reality, human and social perspectives to which no rigid mechanistic formulas can do justice.

These new vistas and the problems which they raise are shown in the expansion of evolutionary ideas in the various fields of the humanities. The basic idea of evolution, the principle of development as a cosmic category, has proved fruitful in many humanistic inquiries. All of us know the productive work which has been done in the evolution of social and economic institutions, the evolution of language, of art, of religion. We have just been considering briefly the investigation of the evolution of morals from the earliest

primitive societies, or earlier still, from the higher animals. The title of a notable treatise by Edward Caird comes to mind: *The Evolution of Theology in the Greek Philosophers.*

The examination of this varied material or even a cursory glance over the bibliographies in these respective fields would show the fruitful expansion of the humanistic outlook by the application of the evolutionary principle. Our insight into any human activity is clarified and deepened as we come to understand its gradual development. The genesis of ideas, practices, and institutions has some of its roots in physiological reactions to conditions in the environment. Searching inquiries in these fields indicate man's groping and then more definite advance from organic drives to intelligent purposes. We may trace the growth of the human animal to fuller rational stature. And we may thus perceive that even at his full maturity man never quite surmounts his animal rootage. He is ever illustrating the truth of Aristotle's definition of him as a rational animal. In his most primitive state he is not altogether a beast, and at his highest levels of civilized existence he is never purely rational. He needs the two perspectives, related, to manifest his full nature.

All these inquiries may be described as studies in the evolution of values. And values are characteristically expressed in contending interplay. Their progressive emergence and development manifest what we may call the twofold, Janus-like outlook of the basic principle of evolution as it is applied to the various humanities. The development of social and economic processes and institutions is obviously bound up with climate, food-supply, and other environmental conditions, as well as with human demands and ideals. Language has its organic medium as well as its almost boundless range

of intellectual and poetic expression. The arts have yielded the high achievements of creative genius, but music has its physical and physiological aspects, and such a book-title as *Anatomy for Art-Students* needs no further explanation. All along the line, evolution in the humanities has been a dual manifestation of the complexity of human nature, emphasizing the need for a philosophy of perspectives, to do justice to the many fundamental aspects of reality.

By way of closing summary, we may state that evolutionary biology, in one direction, has been marked by a thoroughly justified account of living processes in factual-mechanistic terms. But the further evolutionary insight has opened up another perspective of the genetic principle of development. Animal behavior that at its rudimentary beginnings seems to be only very complicated chemistry, manifests increasingly at its higher levels a teleological tendency, and then unambiguously purposive and intelligent activity. The evolutionary biologist was bound to include man in his zoological museum, but the course of evolution in human life could not be understood fully in the earlier terms, as survival or extinction by fortuitously fit or unfit adaptations to certain environments, as a mere mechanics of behavior.

The genetic process at human levels is a process increasingly directed by intelligence, a process of purposive activity, of choice between contending values, of achieving not only organic but also spiritual integration and fulfillment. This sort of genetic process is not a mere series of events but a significant career, which we commonly call history. The principle of evolution as used in the various humanities manifests characteristically this historical aspect.

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NOTES

1. *Holism and Evolution,* p. 337.
2. *Experience and Nature* (1925), p. 163.
3. Cf. R. G. Collingwood, *The Idea of History* (1946), p. 114.
4. Cf. *Philosophy and History,* Cassirer volume, ed. Raymond Klibansky and H. J. Paton (1936), p. 313.
5. *Selected Essays,* p. 23.
6. *On History,* trans. Douglas Ainslie (1921), p. 135.
7. *Space, Time and Deity* (1920), II, 45.
8. *Ibid.,* II, 309. Cf. also *Philosophical and Literary Pieces* (1939), p. 286.
9. *Creative Evolution,* trans. Arthur Mitchell (1922), p. 261.
10. *Ibid.,* pp. 7, 9, 31, 38 f.
11. *Evolution and Adaptation* (1908), p. 29.
12. *The Philosophical Basis of Biology* (1931), pp. 21, 20.
13. Wolfgang Köhler, *The Mentality of Apes,* trans. Ella Winter (1948), pp. 11 ff., 25 ff., 101, 119 f., 128 f., 167 ff., 276.
14. Cf. *Progress and History,* ed. F. S. Marvin (1921), p. 262.